

thick. An inch or so below the rim of the box, lengthwise on either side, was fixed a wooden ledge. The press, instead of being suspended from above, is supported on this ledge and is girded with a canvas skirt which hangs down well below the upper edge of the box. As a source of heat a small electric stove is used, the connecting cord of which passes out through one of several holes which have been bored in the sides of the box near the base.

THE SPECIFIC VALIDITY OF LIMOSELLA SUBULATA.

M. L. FERNALD.

ONE of the most characteristic plants of tidal flats, brackish shores and borders of salt marshes in eastern North America is the little matted and creeping plant which is known in our floras as *Limosella aquatica*, var. *tenuifolia*, or sometimes as a distinct species, *L. tenuifolia*. Our plant, treated either as a variety of *L. aquatica* L. or as a species, *L. tenuifolia* Wolf, is thus inferred to be identical with the European *L. tenuifolia*. But so far as the writer is able to determine, Wolf's species, *L. tenuifolia*,¹ is merely a dwarfed form of the European *L. aquatica*, with the leaf-blade very short and linear instead of narrowly elliptic. This is the estimate of the European *L. tenuifolia* by essentially all European authors, including Hoffmann who originally published it not as a true species but as subordinate to *L. aquatica*; and it has been so regarded in Europe for nearly a century, Schübler & Martens as early as 1834 calling it *L. aquatica* β . *L. tenuifolia*,² a nomenclatorial combination which has been repeatedly published as new by different subsequent authors even down to the year 1909.

Limosella aquatica L. is a characteristic European plant found also in southern Labrador and generally over the western portions of temperate North America, having leaves with definite blades varying from oblong to elliptic in the commoner form of the plant or narrowly oblanceolate to barely linear in the more reduced forms (var. *tenuifolia*).

¹ Wolf. ex Hoffm. Deutsch. Fl. ed. 2, i. part 2, 29 (1804).

² Schübler & Martens, Fl. von Würtemb. 396 (1834).

This plant, *L. aquatica*, with definite leaf-blades has a pronounced rosette-habit, forming ordinarily circular rosettes with the branches decumbent and producing tufts of leaves and numerous flowers at the tips and sometimes again proliferating. In wet habitats the species roots freely at these points of proliferation, but the specimens from Europe, as well as from western America, all show that the individual plants are fairly circumscribed and do not creep extensively. European plates such as those of Reichenbach,¹ *Flora Danica* (table 69) or Sowerby² excellently display the habit and foliage of *L. aquatica*. The plant in Europe, as well as in North America, occurs in fresh soils, chiefly in sandy margins of lakes and ponds, or, as expressed by Syme, "places where water has lain in winter." The plant of the Atlantic seaboard of North America, on the other hand, has absolutely no leaf-blade, the leaves being filiform or nearly terete; and the plant has a very closely repent, matted habit, forming dense turf, with the closely creeping stolons setting under favorable circumstances lines of new tufts, often extending in rows some decimeters away from the parent rosette. The plant is so closely repent that it is impossible in the material from the Atlantic seaboard to find any specimens in which the tufts of foliage are not conspicuously rooting at base and the plant is usually so matted as to form a turf almost impossible of disentanglement. This closely matted or creeping plant of Atlantic America is found strictly in saline or subsaline soils, always on the coast, the only specimens from inland stations coming from points not further than one or two miles from the sea.

It would therefore seem very improbable that the plant of eastern America, from Newfoundland and the lower St. Lawrence to New Jersey and eastern Pennsylvania, is conspecific with the plant of quite different habit, which is so widely spread in fresh habitats over Europe and western America. Many attempts have been made in the past to separate our coastal plant, but, so far as the writer can find, these have all proved unconvincing, and the Atlantic coast plant has been left in all recent treatments either as *L. aquatica* or as the European dwarfed var. *tenuifolia*. The first attempts to distinguish the American from the European plant were made early in the last century when the species was discovered in southern New England and on the lower Delaware. In 1816 Messrs. H. N. Fenn and M. C.

¹ Reichenbach, Ic. Fl. Germ. xx. tab. 1722 (1862).

² Sowerby, Engl. Bot. ed. Syme, vi. tab. 968 (1873).

Leavenworth discovered the plant at New Haven, "on the margin of the river, where it was covered by every tide";¹ and later in the year Dr. Eli Ives of New Haven collected it in brackish soils "in great abundance in the Housatonic and in most of the rivers which empty into Long-Island Sound, within the range of the tide," and he also stated in his publication that "it has been found this year [1817] by Messrs. Nuttall and Collins, on the banks of the Delaware near Philadelphia."² Dr. Ives felt that he had a new species, which he published with a very full description, as *L. subulata*.² Simultaneously Nuttall was writing up the same plant and his description of it appeared while Dr. Ives's description of *L. subulata* was in press, Nuttall identifying the plant as the European *L. tenuifolia*, but giving a very detailed account of his material, which came from "miry and gravelly banks of the Delaware, subject to the overflowings of the tide, in New-jersey and Pennsylvania, near Kensington, in the suburbs of Philadelphia" "also in Connecticut; — Dr. Ives, in a letter to Z. Collins, Esq."³ Nuttall's description was quite as detailed as that of Ives, but as noted, Nuttall treated his plant as *L. tenuifolia* Wolf.

Somewhat later, in 1833, Rafinesque described the plant of New Jersey as a new genus, *Ygramela*, with the species *Y. maritima*⁴ but with the pharisaical desire to be on both sides of the fence, like some modern authors, he added the comment: "If some Botanists will unite it to *Limosella* . . . they may call it *L. maritima*." In his discussion Rafinesque laid much stress upon the habit of the plant, saying "it has the habit of *Limosella*, but forms a compact short turf."

All subsequent authors, so far as the writer can determine, have maintained our plant as identical with the European *L. tenuifolia*, sometimes as a variety, sometimes as a species, but with no statement of additional characters. A close inspection shows, however, that there are certain tendencies which are fairly constant and which indicate that our plant is probably best treated as a distinct species of eastern America. The leaves and habit have already been discussed. European authors are essentially unanimous in their statement that the corolla of *L. aquatica* is pink or flesh-color, only occasionally white; but the plant of the maritime sands and marshes of eastern America

¹ Ives, Am. Jour. Sci. i. 74 (1819).

² Ives, Trans. Physico-Medical Soc. N. Y. i. 441 (1817).

³ Nutt. Journ. Acad. Nat. Sci. Phil. i. 115, 116 (1817).

⁴ Raf. Atl. Journ. i. 199 (1833).

has the corolla white or at most with a bluish tinge on the outside. The calyx of the European plant is uniformly described and illustrated as regular; but in the plant of eastern America the calyx, although sometimes nearly regular, usually has the lobes somewhat united in twos, a character pointed out by Dr. Ives in his original description of *L. subulata*, when he laid much emphasis upon this point. The material of *L. aquatica* from western America agrees with the European in its very regular calyx and the descriptions of the plant of western America state that the corollas are usually pink. In *L. subulata* the scapes are very quickly recurved, so that the fruiting plants form a close tangle of arching and interlocking scapes. In the European species this arching is much less conspicuous, as it is in the material of *L. aquatica* in western America, where many of the scapes stay quite straight and erect until maturity, although some arching is found in *L. aquatica*. The style of *L. subulata* is more slender and delicate and usually more curved than in *L. aquatica*, in which the style is straight and comparatively short, although the difference is a minute one and better seen by comparison than indicated by measurement. In the capsule of *L. aquatica* the margins of the valves are thickened so that the dehisced valves appear to have a "wire-edge," but in *L. subulata* the edges of the valves are without this thickening, being thin and often more or less involute in the old capsules. Attempts have been made to find stable characters in the seeds but thus far these have failed, although there are occasional specimens which show recognizable differences; but in view of the very different habit of *L. subulata* and its uniformly saline or brackish habitat, its strictly bladeless leaves, its white corollas, its usually irregular calyx and the thin-edged valves of its capsules, it would seem that *L. subulata* should be recognized as a valid species of the brackish and saline shores from Newfoundland and the lower St. Lawrence to the lower Delaware River.

The only material of *L. aquatica* yet known from eastern America is from the southeastern corner of the Labrador peninsula, where it was collected in 1882 by the late John A. Allen and more recently (in 1915) by Dr. St. John on sandy pond shores, just within the Straits of Belle Isle. The material is immature in both instances but presents no characters which seem to separate it from the common *L. aquatica* of Europe and of western America, but it is noteworthy that this plant of fresh sands and pond-shores is not found generally

about the Gulf of St. Lawrence or in Newfoundland, where *L. subulata* abounds in brackish habitats or in the salt marshes. Certain specimens from the Andes of Bolivia strongly simulate *L. subulata*, but they are very immature and until further material is available, it is impossible to say anything of their exact identity. It would be highly improbable, however, though not without precedent, that *L. subulata*, which in North America seems so definitely confined to the temperate Atlantic shores, should also occur in the Andes.

The nomenclatorial history of *Limosella subulata* may be summarized as follows:

LIMOSELLA SUBULATA Ives, Trans. Phys.-Med. Soc. N. Y. i. 441 (1817), Am. Journ. Sci. i. 74 (1819). *L. tenuifolia* Nutt. Journ. Acad. Nat. Sci. Phil. i. 115 (1817), not Wolf. *Ygramela maritima* Raf. Atl. Journ. i. 199 (1833). *L. maritima* Raf. l. c. (1833). *L. aquatica*, var. *tenuifolia* Torr. Fl. N. Y. ii. 40 (1843), not Schübler & Martens, Fl. von Würtemb. 396 (1834).

GRAY HERBARIUM.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XXVIII.

THIS list includes a large number of waifs, mostly wool-waste plants from the West and from southern Europe. Few if any of them have really persisted and spread, but it has seemed well to include them, as they are all represented by identifiable specimens, and as many of them have already been published in Dame & Collins's Middlesex Flora. The specimens have been carefully compared with authentic material in the Gray Herbarium.

Our knowledge of these interesting plants is due chiefly to those earnest collectors, Dr. Charles W. Swan, Charles E. Perkins, Rev. W. P. Alcott, Miss Emily F. Fletcher and Mrs. C. N. S. Horner. Mr. Alcott's collections are poorly represented in the Club Herbarium, so, if any reader knows where the main Alcott herbarium is kept, he will do a service by notifying the committee.